



IN THE U.S. PATENT AND TRADEMARK OFFICE

AP. 2829

Applicant: **Makoto Yoshino, et al.**

Docket No.: **TIJ-29448**

Serial No.: **09/909,013**

Art Unit: **2829**

Filed: **07/19/2001**

Examiner: **Geyer, Scott B.**

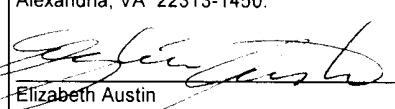
For: **Semiconductor Package Insulation Film
And Manufacturing Method Thereof**

Conf. No.: **8724**

APPEAL BRIEF TRANSMITTAL FORM

Commissioner for Patents
Alexandria, VA 22313-1450

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 Elizabeth Austin	<u>9/8/2003</u> Date

Transmitted herewith in triplicate is an Appellant's Brief in the above-identified application.

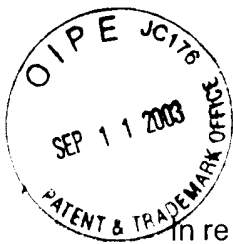
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Respectfully submitted,



Michael K. Skrehot
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Yoshino, et al.

Serial No.: 09/909,013

Filed: 07/19/2001

For: Semiconductor Package Insulation Film and Manufacturing Method
Thereof

Conf. No.: 8724

Docket No.: TI-29448

Examiner: Geyer, Scott B.

Art Unit: 2829

Appeal Brief

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

MAILING CERTIFICATE UNDER 37 C.F.R. §1.8(A)

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Elizabeth Austin
Elizabeth Austin

Dear Sir:

Pursuant to the Notice of Appeal mailed 07/08/03, Appellant submits this appeal brief in triplicate. The Commissioner is hereby requested and authorized to charge any fees necessary for the filing of the enclosed papers to deposit account number 20-0668 of Texas Instruments Incorporated.

Real Party in Interest

The real party in interest is Texas Instruments Incorporated.

Related Appeals and Interferences

No related appeals or interferences are known to Appellant.

Status of Claims

Claims 5-19 are pending in this application. Claims 5-10, 12, 14, 15, and 17-19 are the subject of this appeal.

Claims 5 and 6 stand rejected under 35 U.S.C. 102(b) as being anticipated by Appellant's admitted prior art.

Claims 7, 8, and 12 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Appellant's admitted prior art in view of Cho (U.S. Patent No. 6,235,555).

Claims 9 and 10 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Appellant's admitted prior art.

Claims 14, 15, 17, and 19 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Appellant's admitted prior art in view of Cho.

Claim 18 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Appellant's admitted prior art and Cho as applied to Claim 14, and further in view of Hashimoto (U.S. Patent No. 6,200,824).

Claims 11, 13, and 16 stand objected to as depending from a rejected base claim, but have been indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Status of Amendments

All amendments have been entered.

Summary of Invention

One embodiment of the invention is a method for the manufacture of an insulation film 10 for providing an insulation substrate for carrying a

semiconductor chip 90 of a semiconductor package. The method includes the steps of: providing an insulation film 10 having two rows of sprocket holes 12 comprising a plurality of sprocket holes formed at a pitch L along both edges of the insulation film; and forming a two-dimensional array of through holes 14 in said insulation film between the rows of sprocket holes, each through hole in said array spaced from adjacent through holes by a pitch p (see Figure 2 and the text referring to Figures 1, 2, and 3 on pages 7 and 8 of the instant specification).

Issues

1. Whether Claims 5 and 6 are patentable under 35 U.S.C. 102(b) over Appellant's admitted prior art.
2. Whether Claims 7, 8, and 12 are patentable under 35 U.S.C. 103(a) over Appellant's admitted prior art in view of Cho (U.S. Patent No. 6,235,555).
3. Whether Claims 9 and 10 are patentable under 35 U.S.C. 103(a) over Appellant's admitted prior art.
4. Whether Claims 14, 15, 17, and 19 are patentable under 35 U.S.C. 103(a) over Appellant's admitted prior art in view of Cho.
5. Whether Claim 18 is patentable under 35 U.S.C. 103(a) over Appellant's admitted prior art and Cho as applied to Claim 14, and further in view of Hashimoto (U.S. Patent No. 6,200,824).

Grouping of Claims

Claims 5, 7, 8, 9, 10, 12, 14, and 18 stand or fall together, but as a group these claims stand or fall independently of any other claim. Claim 6 stands or falls separately from any other claim. Claims 15 and 17 stand or fall together, but as a group these claims stand or fall independently of any other claim. Claim 19 stands or falls independently of any other claim.

Argument

1. Claims 5 and 6 are patentable under 35 U.S.C. 102(b) over Appellant's admitted prior art.

Claim 5 includes the step of "forming a two-dimensional array of through holes in said insulation film between the rows of sprocket holes, each through hole in said array spaced from adjacent through holes by a pitch p ." Appellant's admitted art does not include such a step. The Examiner relies on the following sentence in the instant disclosure for the basis of the rejection: [b]eneath the region of this circuit pattern 114, multiple through holes are formed prior to formation of this circuit (not shown in the figure)." The Examiner's reasoning is that Appellant in the quoted sentence discloses the use of at least two through holes, that the at least two through holes are spaced two-dimensionally from one another, and that therefore the two through holes define an array. However, Appellant has claimed "forming a two-dimensional array of through holes", not spacing through holes two-dimensionally. The plain meaning of "array" is "[a] rectangular arrangement of quantities in rows and columns, as in a matrix" (*Webster's II New Riverside University Dictionary*, Houghton Mifflin Co., 1984, page 126). By describing the through holes as being formed in a two-dimensional array, Appellant has specified that the holes are in an arrangement of more than one row and more than one column, whereas a one-dimensional array would have only one row or one column. Appellant respectfully submits that one skilled in the art would appreciate this distinction. Since Appellant's admitted art does not teach or suggest all of the limitations of Claim 5, Appellant respectfully submits that Claim 5 is patentable over the admitted art.

Claim 6 depends from Claim 5 and is therefore patentable over the admitted art for at least the reasons presented above. In addition, Claim 6 includes the feature "wherein the pitch L and the pitch p satisfy the following equation: $m p = n L$ wherein n and m are integers that satisfy the equation $n <$

m." Appellant's admitted art does not teach or suggest through holes in any such arrangement. Therefore, Appellant respectfully submits that Claim 6 is patentable over that art.

2. Claims 7, 8, and 12 are patentable under 35 U.S.C. 103(a) over Appellant's admitted prior art in view of Cho (U.S. Patent No. 6,235,555).

Claims 7 and 8 depend from Claim 5. Claim 12 depends from Claim 9. Both Claims 5 and 9 include the step of "forming a two-dimensional array of through holes in said insulation film between the rows of sprocket holes, each through hole in said array spaced from adjacent through holes by a pitch p ." The shortcomings of Appellant's admitted art have been pointed out above. Cho, cited for its teaching of sprocket holes, does not teach or suggest the forming of a two-dimensional array of through holes as claimed. Since neither Appellant's admitted art nor Cho, taken individually or in combination, teaches or suggests all of the claimed features, Appellant respectfully submits that Claims 5 and 9 are patentable over the cited combination of references. Claims 7, 8, and 12 depend from Claims 5 and 9 and are therefore patentable over the cited combination of references at least by virtue of their dependence from patentable base claims.

3. Claims 9 and 10 are patentable under 35 U.S.C. 103(a) over Appellant's admitted prior art.

Claim 9 includes the step of "forming a two-dimensional array of through holes in said insulation film between the rows of sprocket holes, each through hole in said array spaced from adjacent through holes by a pitch p ." As argued above in Appellant's response to the rejection of Claim 5, Appellant's admitted art does not teach or suggest such a step. Therefore, Appellant respectfully submits that Claim 9 is patentable over the admitted art. Claim 10 depends from Claim 9 and is therefore patentable over the admitted art for at least the reasons presented above.

4. Claims 14, 15, 17, and 19 are patentable under 35 U.S.C. 103(a) over Appellant's admitted prior art in view of Cho.

Claim 14 includes the step of "providing an insulation film having rows of sprocket holes at a pitch L along the edges of said film and a two-dimensional array of through holes in said film between the rows of sprocket holes, said through holes arranged relative to one another in said array at a pitch p ." As argued above with respect to the rejection of Claims 7, 8, and 12, neither Appellant's admitted art nor Cho, taken individually or in combination, teaches or suggests such a step. Therefore, Appellant respectfully submits that Claim 14 is patentable over the cited combination. Claims 15, 17 and 19 depend from Claim 14 and are therefore patentable over the cited combination for at least the reasons presented above.

In addition, Claims 15 and 17 include the feature of through holes arranged relative to one another in said array at a pitch p and continuously along and transversely across said film within circuit pattern regions on said film. Neither Appellant's admitted art nor Cho, taken individually or in combination, teach or suggest holes arranged in an array at a pitch p and continuously along and transversely across a film. Therefore, Appellant submits that Claims 15 and 17 are patentable over the cited combination of references.

Claim 19 includes the step of "depositing metal in selected ones of said number of through holes." The Examiner's rejection of Claim 19 is based on Appellant's alleged teaching of plating the entire surface of the insulating film with metal after the through holes have been formed. A teaching that metal is deposited on the surface of a film does not suggest that metal is deposited in through holes formed in the film. Therefore, Appellant respectfully submits that Claim 19 is patentable over the cited combination of references.

5. Claim 18 is patentable under 35 U.S.C. 103(a) over Appellant's admitted prior art and Cho as applied to Claim 14, and further in view of Hashimoto (U.S. Patent No. 6,200,824).

Claim 18 depends from Claim 14, which is patentable over the combination of Appellant's art with Cho for at least the reasons presented above. Hashimoto does not cure the deficiency of Appellant's admitted art and Cho with respect to Claim 14. In view of the dependency of Claim 18 from Claim 14, Appellant respectfully submits that Claim 18 is patentable over the cited combination for at least the reasons presented above.

Conclusion

In view of the above, Appellant appeals for the reversal of the rejections and allowance of Claims 5-10, 12, 14, 15, and 17-19.

Respectfully submitted,



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APPENDIX

Claims on Appeal

5. (previously presented) A method for manufacture of an insulation film for providing an insulation substrate for carrying a semiconductor chip of a semiconductor package comprising the steps of:

providing an insulation film having two rows of sprocket holes comprising a plurality of sprocket holes formed at a pitch L along both edges of the insulation film; and

forming a two-dimensional array of through holes in said insulation film between the rows of sprocket holes, each through hole in said array spaced from adjacent through holes by a pitch p .

6. (previously presented) The method for manufacture of an insulation film according to claim 5 wherein the pitch L and the pitch p satisfy the following equation: $m p = n L$ wherein n and m are integers that satisfy the equation $n < m$.

7. (previously presented) The method for manufacture of an insulation film according to claim 6 wherein the step of forming the through holes further comprises the steps of:

forming the through holes by collective punching out at the effective sprocket hole formation width of the through holes along the transverse direction of the insulation film in a region of length $n L$ along the length-wise direction of the insulation film;

moving the insulation film a length $n L$ in the length-wise direction by means of the sprocket holes; and

repeating these two steps alternately.

8. (previously presented) The method for manufacture of an insulation film according to claim 6 wherein the method further comprises a step of forming a two-dimensional array of circuit patterns upon the insulation film according to

size of the semiconductor package and a for-plating-electricity-supply-use conductor pattern electrically connected with the array of circuit patterns.

9. (previously presented) A method for manufacture of a semiconductor package comprising the steps of: providing an insulation film, forming two rows of sprocket holes comprising a plurality of sprocket holes formed at a pitch L along both edges of the insulation film, forming a two-dimensional array of through holes between the rows of sprocket holes, each through hole in said array spaced from adjacent through holes by a pitch p , forming a two-dimensional plurality of circuit patterns upon the insulation film according to size of the semiconductor package, forming a for-plating-electricity-supply-use conductor pattern electrically connected with the plurality of circuit patterns having a main line surrounding a perimeter of the plurality of circuit patterns and a sub-line electrically connecting each of the circuit patterns to the main line;

mounting a semiconductor chip within a respective prescribed region of each circuit pattern of the insulation film and electrically connecting the semiconductor chip with the circuit pattern;

performing resin sealing for partitioning off each region enclosed by the main line of the conductor pattern; and

cutting apart into individual semiconductor packages by dicing along the sub-lines of the insulation film.

10. (previously presented) The method for manufacture of a semiconductor package according to claim 9 wherein the method further comprises the step of plating each of the circuit patterns upon the insulation film using the for-plating-electricity-supply-use conductor pattern.

12. (previously presented) The method for manufacture of an insulation film according to claim 7 wherein the method further comprises a step of forming a two-dimensional array of circuit patterns upon the insulation film according to

size of the semiconductor package and a for-plating-electricity-supply-use conductor pattern electrically connected with the plurality of circuit patterns.

14. (previously presented) A method of packaging a semiconductor device, comprising the steps of:

- providing an insulation film having rows of sprocket holes at a pitch L along the edges of said film and a two-dimensional array of through holes in said film between the rows of sprocket holes, said through holes arranged relative to one another in said array at a pitch p ;

- mounting a semiconductor chip over a number of said through holes;

- sealing said semiconductor chip and a portion of said insulation film in resin; and

- cutting said insulation film surrounding said semiconductor chip to release said resin-sealed chip from the remainder of said insulation film.

15. (previously presented) The method of Claim 14, wherein said step of providing an insulation film comprises:

- providing an insulation film having rows of sprocket holes at a pitch L along the edges of said film, and a two-dimensional array of through holes in said film between the rows of sprocket holes, said through holes arranged relative to one another in said array at a pitch p and continuously along and transversely across said film within circuit pattern regions on said film.

17. (previously presented) The method of Claim 14, wherein said step of providing an insulation film comprises:

- providing an insulation film having rows of sprocket holes at a pitch L along the edges of said film, and a two-dimensional array of through holes in said film between the rows of sprocket holes, said through holes arranged relative to one another in said array at a pitch p and continuously along and transversely across said film.

18. (previously presented) The method of Claim 14, further comprising the step of depositing solder in selected ones of said number of through holes.

19. (previously presented) The method of Claim 14, further comprising the step of depositing metal in selected ones of said number of through holes.

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Dictionary

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Reference Division, Houghton Mifflin Company
One Beacon Street, Boston, MA 02108

Library of Congress Cataloging in Publication Data
Main entry under title:

Webster's II new Riverside university dictionary.

1. English language—Dictionaries. I. Riverside Publishing Company. II. Title: Webster's two new Riverside university dictionary. III. Title: Webster's 2 new Riverside university dictionary.

PE1625.W244 1984 423 83-3799

ISBN: 0-395-33957-X (thumb index, trade edition)
0-395-37928-8 (high school edition)

Manufactured in the United States of America

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aromatic (är'ə-mät'ik) *adj.* 1. Having a fragrant, sweet-smelling, or spicy aroma <aromatic incense> 2. Chem. Of, relating to, or containing the six-carbon ring typical of the benzene series and related organic groups. —*n.* An aromatic plant or substance. —*aromatically* *adv.* —*aromaticness* *n.*

aromaticity (är'ə-mät'is-i-tē, är'ə-mä-) *n.* Aromatic quality or character, esp. the distinctive structure or properties of the aromatic chemical compounds.

aromatize (är'ə-mät'iz) *vt.* -tized, -tizing, -tizes. 1. To make aromatic. 2. Chem. To subject to a reaction that produces an aromatic compound. —*aromatization* *n.*

arose (är'əz) *v.* *pt.* of *ARISE*

around (ə-rəund') *adv.* [ME, in the round, in circumference.] 1. On or to all sides or in all directions. 2. In a circle or circular motion. 3. To each member of a group <Will the cake go around?> 4. In or toward the opposite direction, position, or attitude. 5. From one place to another <travel around> 6. Informal. In or close to one's present position <stood around for hours> 7. Informal. To a specific place or area <Come around next week> 8. Informal. To a normal or desired state. 9. Informal. Approximately <around two o'clock> —*prep.* 1. On all sides of. 2. So as to enclose, surround, or envelop. 3. About the circumference or periphery of: ENCIRCLING. 4. About the central point of <the moon's motion around the earth> 5. In or to various places within or near <looking around the store> 6. On or to the farther side of <the farmhouse around the bend> 7. Informal. Approximately at: NEAR <vacations around the Catskills> —*get around*. Informal. 1. To deal or cope with successfully. 2. To succeed in evading or circumventing —*get around to*. Informal. To find time to give one's attention to.

around-the-clock (ə-rəund'thə-klok') *adj.* *var.* of *ROUND-THE-CLOCK*

arouse (ə-rəuz) *v.* *aroused, arousing, arouses.* [*<* ROUSE, on the model of such pairs as rise, arise.] —*vt.* 1. To awaken from or as if from sleep. 2. To stir up; excite or provoke. —*vi.* To be or become aroused. —*arousal* (ə-rəuzəl) *n.* —*arouser* *n.*

arpeggio (är-péj'ē-ō, -péj'ō) *n., pl.* -os. [Ital. < arpeggiare, to play the harp < arpa, harp, of Germanic orig.] Mus. 1. Production of the tones of a chord in rapid succession rather than simultaneously. 2. A chord played or sung in arpeggio. —*arpeggiated* *adj.*

arpent (är-pän') *n.* [Fr. < OFr. < Lat. *arepennis*, half acre, of Gaulish orig.] An old French unit of land measurement equivalent to approx. an acre.

arque-bus (är'kə-bas, -kwə-) *n.* *var.* of *HARQUEBUS*

arack (är'ək, är'äk') *n.* [Ar. *araq*, fruit juice.] A strong alcoholic drink of the Middle East and nearby regions of the Orient, usu. distilled from rice or molasses.

arraign (ə-rän') *vt.* -rained, -raining, -raigns. [ME *arreinen* < OFr. *araisnier* < Vlat. **adrationare*: Lat. *ad-*, to + Lat. *ratio*, account. —see *REASON*.] 1. Law. To call before a court to answer to an indictment. 2. Accuse; charge. —*arraigned* *adj.* —*arraigner* *n.* —*arraignment* *n.*

arrange (ə-ränj') *v.* -ranged, -ranging, -ranges. [ME *arengen* < OFr. *arengier*: *d-*, to (< Lat. *ad*) + *rengier*, to put in a line < reng, line, of Germanic orig.] —*vt.* 1. To put into a specific order or relation; DISPOSE. 2. To plan or prepare for. 3. To agree about; SETTLE. 4. Mus. To reset (music) for other instruments or voices or for another style of performance. —*vi.* 1. To come to an agreement. 2. To make preparations: PLAN. —*arranger* *n.*

arrangement (ə-ränj'mənt) *n.* 1. The act or process of arranging. 2. The condition, manner, or result of being arranged: DISPOSAL. 3. A collection of things that have been arranged. 4. *often arrangements*. A provision or plan made in preparation for an undertaking. 5. An agreement or settlement: DISPOSITION. 6. Mus. *a.* An adaptation of a composition for other instruments or voices or to another style or level of difficulty. *b.* A composition so adapted.

arrant (är'ənt) *adj.* [Var. of *ERRANT*.] Completely such: THOROUGHGOING <an arrant liar> —*arrantly* *adv.*

arras (är'əs) *n.* [ME, after Arras, France.] 1. A tapestry. 2. A wall hanging.

array (ə-rä') *vt.* -rayed, -raying, -rays. [ME *arraien* < OFr. *areer* < Vlat. **arredare*, of Germanic orig.] 1. To arrange or draw up, as troops in battle order. 2. To clothe in finery: ADORN. —*n.* 1. An orderly arrangement, esp. of troops. 2. An impressive display of numerous persons or objects <"a heathenish array of monstrous clubs and spears" —Melville> 3. Splendid attire: FINERY. 4. Math. *a.* A rectangular arrangement of quantities in rows and columns, as in a matrix. *b.* Numerical data linearly ordered by magnitude. 5. An arrangement of computer memory elements in one or several planes.

arrayal (ə-rä'al) *n.* 1. The act or process of arraying. 2. Something arrayed.

arreage (ə-rir'i) *n.* 1. The state of being in arrears. 2. An amount owed in payment.

arrears (ə-rirz) *pl. n.* [*<* ME *arriere*, behind < OFr. *arere* < Llat. *ad retro*, backward: Lat. *ad-*, to + Lat. *retro*, behind.] 1. An unpaid and overdue debt or unfulfilled obligation. 2. The state of being behind in fulfilling contracted obligations or payments.

arrest (ə-rést') *vt.* -rested, -resting, -rests. [ME *arresten* < OFr. *arrestar* < Vlat. **arrestare*: Lat. *ad-*, to + Lat. *restare*, to stand still

(*re-*, back + *stare*, to stand)] 1. To stop or check the motion, progress, growth, or spread of <arrest a cold> 2. To seize and hold under authority of the law. 3. To capture and hold briefly (e.g., attention): ENGAGE. —*n.* 1. The act of arresting or the state of being arrested. 2. A device for arresting motion, esp. of a moving part. —*under arrest*. Detained in legal custody. —*arrested* *adj.* —*arrestment* *n.*

* *syns*: ARREST, APPREHEND, BAG, BUST, COLLAR, DETAIN, PICK UP, PINCH, RUN IN, SEIZE *v.* *core meaning*: to take into custody <was arrested for car theft>

arresting (ə-rés'ting) *adj.* Attracting and holding the attention: ENGAGING —*arrestingly* *adv.*

arrhythmia (ə-rith'mē-ə) *n.* [Gk. *arruthmia*, lack of rhythm, *arruthmos*, unrhythmic: *a-*, without + *rhythmos*, rhythm.] Lack of regularity in the force or rhythm of the heartbeat.

arrhythmic (ə-rith'mik) *also arrhythmical* (mī-kəl) *adj.* Lacking rhythm or rhythmic regularity. —*arrhythmically* *adv.*

arrière-ban (är'ē-är-bän', -bän') *n.* [Fr. < OFr. *arrière-ban*, abolition of herban, of Germanic orig.] 1. A royal proclamation by which medieval French vassals were summoned to military service. 2. The vassals summoned by an arrière-ban.

arrière-pensée (är'ē-är-pän-sä') *n.* [Fr. < *arrière*, in back + *idée*, thought.] An ulterior motive.

arris (är'is) *n., pl.* *arris* or *ris-ces*. [Alteration of OFr. *arest*, ridge —see *ARÊTE*.] The sharp edge or ridge formed by two surfaces meeting at an angle, as in an architectural molding.

arrival (ə-riv'əl) *n.* 1. The act or process of arriving. 2. One that arrives or has arrived. 3. Attainment of a goal as a result of a process or effort.

arrive (ə-riv') *vi.* -rived, -riving, -rives. [ME *ariven* < OFr. *ariver* < Vlat. **arripere*: Lat. *ad-*, to + Lat. *ripa*, shore.] 1. To reach a destination. 2. To take place <The big day finally arrived> 3. To achieve success or recognition. —*arrive at*. To attain through a process or effort. —*arriver* *n.*

arri-viste (är-rē-vést') *n., pl.* -vistes (-vêst') [Fr. < *arriver*, to arrive < OFr. *ariver*.] A social climber: UPSTART.

arro-ba (ə-rō'bā) *n.* [Sp. and Port. < Ar. *ar-rub*, the quarter (of a quintal).] 1. A former unit of weight in Spanish-speaking countries, equal to approx. 25 pounds. 2. A former unit of weight in Portuguese-speaking countries, equal to approx. 32 pounds. 3. A former liquid measure in Spanish-speaking countries, having varying value but prox. equal to 17 quarts when used to measure wine.

arrogant (är'ə-gənt) *adj.* [ME *arrogant* < OFr. < Lat. *arrogans*, *pr. part.* of *arrogare*, to arrogate.] 1. Over convinced of one's own importance: HAUGHTY. 2. Marked by or arising from haughty self-importance. —*arrogance* (-gəns) *n.* —*arrogantly* *adv.*

* *syns*: ARROGANT, CAVALIER, DISDAINFUL, HAUGHTY, HIGH-AND-MIGHTY, HOITY-TOITY, INSOLENT, LOFTY, LORDLY, OVERBEARING, OVERWEENING, PRESUMPTUOUS, PROUD, SUPERCILIOUS, SUPERIOR *adj.* *core meaning*: over convinced of one's own superiority and importance <an arrogant, selfish person>

arrogate (är'ə-gär') *vt.* -gated, -gating, -gates. [Lat. *arrogare*: *ad-*, to + *rogare*, to ask.] 1. To claim, take, or assume for oneself without right. 2. To attribute to another unjustifiably. —*arrogation* *n.* —*arrogative* *adj.* —*arrogator* *n.*

arrondissement (ä-rön-dēs-män') *n.* [Fr. < *arrondir*, to round out: *d-*, to (< Lat. *ad*) + *roundir*, to make round.] 1. The chief administrative subdivision of a department in France. 2. A municipal division of some large French cities.

arrow (är'ō) *n.* [ME *arwe* < OE *arewe*.] 1. A thin, straight shaft for shooting from a bow, usu. made of light wood with a pointed head at one end and flight-stabilizing feathers at the other. 2. Something similar to an arrow in form, function, or speed. 3. A sign or symbol shaped like an arrow and used to indicate direction.

arrow-head (är'ō-héd') *n.* 1. The pointed, removable striking part of an arrow. 2. Something shaped like an arrowhead, as a mark indicating a limit on a drawing. 3. An aquatic or marsh plant of the genus *Sagittaria*, bearing arrowhead-shaped leaves and white flowers.

arrow-root (är'ō-rōōt', -rōōt') *n.* [So called because it was used to draw poison from arrow wounds.] 1. A tropical American plant, *Maranta arundinacea*, with roots that yield an edible starch. 2. The starch from the arrowroot and from certain plants of the genera *Manihot*, *Curcuma*, and *Tacca*.

arrow-wood (är'ō-wōōd') *n.* A small shrub of the genus *Viburnum*, having straight tough stems once used to make arrows.

arrow worm *n.* A small, slender marine worm of the phylum Chaetognatha, with prehensile bristles on each side of the mouth.

arroyo (ə-rōi'ō) *n., pl.* -os. [Sp., ult. < Lat. *arrogia*, mineshaft.] 1. A deep gully cut by an intermittent stream. 2. A brook or creek.

arsenal (är'sə-nəl) *n.* [Ital. *arsenale* < Ar. *dār-as-sindāh*: *dār*, house + *as*, the + *sindāh*, manufacture < *sandā*, he made.] 1. A governmental establishment for the storing, manufacturing, or repairing of war materiel, as arms and ammunition. 2. A stock of weapons.

ä pat ä pay ärcare ä father é pet é be hw which i tie ir pier ö pot ö toe ö paw, for oi noise öo to

more or supply <had arsenic>

arsenic (är'sē-nik, -nit') *n.* A sa-
lute (är'sē-nik) *n.* [ME *arseni-*
yellow orpiment < Pers. *z*
poisonous metallic element

state devices, and various a-
2. Arsenic trioxide. —
arsenic, esp. with valenc

ic acid (är'sē-nik) *n.* A poi-
compound, H₃AsO₄, used to m-

ical (är'sē-nik) *adj.* Or
ison or drug containing arser

trioxide (är'sē-nik) *n.*
As₂O₃, used in insecticide

ide (är'sē-nid') *n.* A compo-
sive element.

ous (är'sē-nid-əs) *adj.* Of
arsenic

pyrite (är'sē-nō-pī'rīt')
essentially FeS₂/FeAs₂

shen') *n.* *var.* of ARCHIT-
shen') *n.* [ARS(EN)

very poisonous gas, AsH₃, use
mid-state doping agent, and in

(är'sis) *n., pl.* -ses (-sēz') [L
beat < *aeirein*, to lift.] 1. T-

quantitative verse. 2. The
actual verse. 3. Mus. The una-

(är'sən) *n.* [AN < OFr. *arçu-*
shen') The crime of malicious!

or of burning one's own pro-
insurance. —*arsonist* *n.*

phen-amine (är's-fēn'ə-mēn)
A yellow hygroscopic po-

to treat syphilis.

(är't) *n.* [ME < OFr. < Lat. *a-*
ment, alter, or counteract the

agement or production of soun-
elements in a way that affect

beautiful in a graphic or p-
activities. *c.* The product of t-

tion or execution, as found
A field or category of art, a

specific branch of learning, a
of principles and methods u-

ies <the art of baking> *b.* A
of principles and methods <

skill in adept performance
ive faculties that cannot be le-

elling> *8. a. arts.* Artful str-
lative material in a printed

(är't) *är* when stressed) *v.* [ME
present indicative of *BE*.

diff. var. of *ARD*.

déco (dēk'ō) *n.* [Fr. *Art Déco*
Arts Décoratifs et Industriels

France.] An early 20th-cent.
metric designs and bold colors.

de-fact (är'tō-fäkt') *n.* *var.* of *A*
tel' (är'tēl') *n.* [R. *arte*] < Ital. *a*

A cooperative enterprise of ag-
U.S.S.R.

emis (är'tō-mis) *n.* [Gk.] Gk
(and the moon and twin sister

emis-ia (är'tō-miz'hē-ə, -mī-
wor) < OFr. < Lat. *artemisia* < *a-*

it was sacred.] A plant of t
or wormwood.

er-ial (är'tir'ē-əl) *adj.* 1. Of li-
ing the bright-red blood in the

the lungs. 3. Of or designating

flow with many branches —

ally *adv.*

er-ial-ize (är'tir'ē-əl-iz) *vt.* *er-*
ous blood) into arterial blood

—*arte-rial-iza-tion* *n.*

io- *pref.* [Gk. *artērio-* < *artē-*

>

er-iography (är'tir'ē-ōgrā-
following injection of a rac-

trō-gām') *n.* —*arte-ri-o-gra-*

er-icle (är'tir'ē-ōl') *n.* [NLA

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